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General Micro Systems Launches Apex, the Highest Performance Upgradeable Secure Server under ITAR Control

Intel® dual Xeon® 2U server, with 1 TB of RAM, 96 TB SSD storage, quad GPGPU, APU, and utilizes industry-proven OpenVPX open architecture with lowest TCO

AUSA, Washington DC, October 9, 2018 – General Micro Systems, Inc. (GMS) today launched Apex, the "Forever Server" system that is compact, secure, exceptionally powerful, rugged and modular. Designed for harsh use but able to evolve and upgrade as system needs change over many years, Apex is so densely packed that it can reduce an entire rack's worth of functionality into a single product—also saving size, weight, power (SWaP) and total cost of ownership (TCO).

"Too often, 'bargain priced,' commercial-quality and foreign-sourced servers are chosen for use in deployed or secure military environments like those in shipboard, airborne and vehicle applications," said Ben Sharfi, CEO and chief architect, GMS. "These single purpose servers, however, can put lives at risk with questionable ruggedness and dubious security, and end up costing significantly more in the long run when requirements change and they quickly become obsolete and in need of replacement within 12-18 months."

For these rugged environments, GMS designed Apex from the metal up to be not only ruggedly mil-ready, but to save money by consolidating many separate system boxes and functions into one server; and by making it easily upgradeable through modular subsystems that evolve as program, platform and technology needs change.

The "Forever Server": Apex

Based upon the GMS S2U server, Apex is a standard width 19-inch "total rack" compact dual Intel® Xeon® server system that replaces up to 17U worth of equivalent equipment in only 2U of shelf space. Using a "system of systems," Apex contains six super-dense hot swappable modules that can each be upgraded and evolved over time—providing years of life evolution to DoD platforms and systems.

Key Benefits of Apex
The "Forever Server"

- Made and designed in America by ITAR-approved supplier
- Replaces 17U of equipment in 2U, saving massive size and weight
- VPX-based LRU-replaceable modules make easy repair and are "forever" upgradeable
- Built-in 1 Gb and 40 Gb Ethernet switch allows fast routing in a single-chassis
- Add-in dual Nvidia® Tesla V100 GPGPUs gives mobile supercomputer algorithm performance

"Apex is unlike any other server, and the key uniqueness is two-fold," Sharfi added. "First, every subsystem is modular and uses the military standard OpenVPX architecture, which is trusted in deployed military systems. No other server uses this dependable modular interconnect." Translation: Apex is rugged, reliable, and designed for harsh duty.

All six of Apex's subsystems can be swapped out as technology evolves—or different modules can be swapped in as long lifecycle DoD program needs change. This means that Apex can be upgraded for many years as new technology evolves, merely swapping out the subsystem modules while maintaining the same in-system footprint, interfaces, and software configuration.

This technology refresh—or pre-planned product improvement (P3I)—is a huge benefit in long lifecycle government and military programs, and it saves money compared to commercial servers. In contrast, commercial servers are usually obsolete within 12-18 months and are discarded in favor of new hardware; and, there's no guarantee that interfaces and software remain consistent.

FlexVPX™ Multi-dimensional Backplane Fabric: Mobile Supercomputer
"The second unique feature of Apex is our FlexVPX™ multi-dimensional fabric backplane that runs natively at PCIe Gen 3 *directly* to *every* subsystem," said Sharfi. "No other server on the market can connect so many in-chassis subsystems directly at full-rate PCIe Gen 3." FlexVPX™ is also upgradeable up to over 20 Gbps, giving Apex's customers a "future-proof" server.

While the technology is unique, another benefit is that with such a high-performance in-chassis architecture, Apex combines many rackmount systems into the *single* Apex chassis—up to 17U worth of separate chassis from other suppliers. This saves money because one Apex server replaces several other systems like a GPGPU co-processor box, an APU, a PCIe expansion chassis, secure removable storage, and more.

FlexVPX™ also extends *outside* of Apex to an expansion chassis for Nvidia® GPGPU or Xilinx® FPGA co-processor engines for deep learning, data mining, augmented reality, or blockchain or hash algorithm engines. This accessory turns one 2U Apex into a mobile supercomputer—bringing unheard of performance onto the battlefield in a very small footprint.

Example Use Cases
Apex's modularity not only enables P3I upgrades, it simplifies sparing. In shipboard applications, for example, dozens and dozens of new commercial servers are stowed aboard in advance of deployment to be used as spares. This is expensive, takes space, and adds weight and inconvenience. With Apex, the OpenVPX modules are more reliable compared to commercial servers. As well, customers need only swap out Apex modules in the event of failure—not the entire server. The cost and logistics savings is obvious.

Apex also contains twelve removable drives, plus six fixed drives (five SAM I/O or mSATA plus M.2 on XMC). With the removable drives, up to 96 TB (8 TB x 12) of encrypted storage can be used for data recording.

"Encryption is critical in both enterprise and defense applications, especially with the turmoil happening in the world today," Sharfi said. "Apex's drives can be encrypted and are available as FIPS-140-2, but the ability to remove and transport individual drives or the *entire* 8-drive Mass Storage or 4-drive system I/O modules is a game-changer for convenience and data security workflow." Apex becomes the world's most powerful and secure sensor/image data recorder.

Tech Details: Apex is a Future-Proof Modular System of Systems
Apex modules encompass three key areas: CPU and Bus Fabric; Networking and I/O; and Storage. The following list identifies how a 2U Apex server can replace up to 17U of other equipment.

CPU, Bus Fabric, Power
Apex uses two of Intel's highest-performing Xeon® E5 22 core server CPUs, adds 1 TB of DDR4 ECC-protected DRAM, and the FlexVPX™ bus fabric routes 80 PCIe Gen 3 8 Gbps lanes between subsystem modules for a flow-through architecture. FlexVPX™ is capable of scaling to 20 Gbps as technology evolves, making Apex future-proof.

Supporting the CPU subsystem are six 40 Gbps fiber Ethernet ports, plus two 1 Gbps copper Ethernet ports—all operating at full bandwidth, plus a baseboard management controller for out-of-band management capabilities over IPMI, including SNMP. An HDMI port is used for console video, and there are 6 USB 3.0 ports, 2 USB-C ports with 45 W power delivery, a removable and "sanitizable" SSD for the operating system which can be substituted for an XMC I/O module.

Unique to Apex are 32 lanes of PCIe Gen 3 to other expansion chassis such as those from One Stop Systems or other GPGPU deep learning systems. The fabric also connects multiple Apex servers together.

Apex is powered by three N+1 redundant MIL-STD-704 AC or MIL-STD-1275 DC power supplies and contains an inboard auxiliary power unit (APU). 400 Hz AC power is available for avionics applications.

Networking and I/O
As mentioned, Apex contains up to six 40 Gb Ethernet ports and two 1 Gb Ethernet ports, plus there are 20 1 Gb Ethernet ports and a Cisco® hardware router. Add-in I/O cards include slots for 4 full-size x16 PCIe Gen 3 cards, XMC, and M.2. Five onboard PCIe-Mini I/O modules add either fixed mSATA storage or other I/O, such as MIL-STD-1553 or CANbus.

Storage
Two removable drive units form Apex's main 96 TB of storage (with 12 TB SSDs). The 8-bay subsystem has 8 individually removable hardware-encrypted RAID SSDs, plus 4 additional system I/O removable SSDs. Each of these subsystems is transportable to other Apex servers or to a docking station. Other storage includes up to 5 mSATA fixed storage modules plus an XMC-based removable M.2 for the operating system.

- Information about Apex can be found at:
  http://www.gms4sbc.com/index.php/products/servers/item/apex
- Apex datasheet:
  http://www.gms4sbc.com/images/Products/Servers/Apex/2018_APEX.pdf
- Apex hi-res images: http://www.gms4sbc.com/press/Apex/
- For more information regarding GMS products, please visit: www.gms4sbc.com

GMS will showcase the new Apex at AUSA, DC; October 8-10, 2018
Come see us at booth #9335.

About General Micro Systems:
General Micro Systems (GMS) is the industry expert in highest-density, modular, compute-intensive, and rugged small form-factor embedded computing systems, servers, switches and smart displays. These powerful systems are ideal for demanding C4ISR defense, aerospace, medical, industrial, and energy exploration applications. GMS is an IEC, ISO, AS9100, NIST-800-171, and MIL-SPEC supplier with infrastructure and operations for long-life, spec-controlled, and configuration-managed programs. Designed from the ground up to provide the highest performance and functionality in the harshest environments on the planet, the company's highly customizable products include GMS Rugged DNA™ with patented RuggedCool™ cooling technology. GMS is also the leader in deployable high-end Intel® processors and a proud Intel® partner since 1986. For more information, visit www.gms4sbc.com.

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